

U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION 6

Technical Support Document

EPA Review of 2015 Revisions to the
Oklahoma Water Quality Standards

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TECHNICAL SUPPORT DOCUMENT
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EPA Review of 2015 Revisions to the Oklahoma Water Quality Standards

I. Overview

Under Clean Water Act (CWA) Section (§) 303(c) and the implementing regulation found in the *Code of Federal Regulations* (CFR) at 40 CFR §131.4, states and authorized tribes¹ have the primary responsibility for reviewing, establishing, and revising water quality standards (WQS), which consist of the three primary components: designated uses, criteria to protect those uses, and antidegradation requirements.² In addition, CWA §303(c) and 40 CFR §131.20 require states to hold public hearings at least once every three years to review and, as appropriate, modify and adopt standards. The U.S. Environmental Protection Agency (EPA) reviews new and revised WQS that have been adopted by states. Authority to approve or disapprove new or revised standards submitted to EPA has been delegated to the Water Division Director in Region 6. State WQS are not considered effective under the CWA until approved by EPA.

The purpose of this Technical Support Document (TSD) is to provide the basis for EPA's decisions under CWA §303(c) and the implementing regulation found at 40 CFR §131 on revisions to Oklahoma's WQS. Oklahoma's WQS are found in the *Oklahoma Administrative Code* (OAC), Title 785, Chapter 45. The revisions were proposed in the *Oklahoma Register* on December 1, 2014, with the public comment period occurring through January 20, 2015. Final revisions were adopted by the Oklahoma Water Resources Board (OWRB) on February 17, 2015, and submitted to EPA Region 6 on January 11, 2016. EPA received OWRB's submission on January 28, 2016, along with a letter dated November 17, 2015, from the Oklahoma Attorney General E. Scott Pruitt certifying that the Oklahoma WQS were duly-adopted pursuant to state law.

Oklahoma's WQS submittal to EPA included the revisions summarized in the list below.

- Several amendments clarifying language associated with dissolved oxygen (DO) criteria:
 - striking the use support assessment language found in OAC 785:45-5-12(f)(1)(D);
 - modifying OAC 785:45-5-12(f)(1)(C) to include (i) and (ii) which will retain the provisions that pertain to acute DO events; and
 - amending Table 1 of Appendix G with two additional footnotes clarifying how the 10% exceedance frequency is to be used and specifying where the warm Water Aquatic community (WWAC) DO criteria apply in lakes.
- Revisions to Requirements For Development of Site-Specific Criteria For Certain Parameters, Appendix E, that include:

¹ Other than when used to refer specifically to the State of Oklahoma, use of the word "states" or "state" throughout this document refers to: The 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and Indian Tribes that EPA determines to be eligible for purposes of WQS program. See definition for "states" provided at 40 CFR § 131.3(j).

² For a more detailed description of what constitutes a new or revised WQS under CWA §303(c), please refer to EPA's October 2012 "Frequently Asked Questions" document (EPA Publication No. 820F12017) available online at: <http://www.epa.gov/sites/production/files/2014-11/documents/cwa303faq.pdf>.

- the addition of a site specific Water Effect Ratio and Dissolved Translator standards for use in calculating permit limits for copper and zinc for the Broken Bow Public Works Authority's OPDES permit related to discharge of municipal and industrial wastewater to a tributary of Yanubbe Creek.

As stated above, Oklahoma's 2015 WQS submittal contained revisions to Oklahoma's DO criteria. In 2010, Oklahoma's WQS (Chapter 45) included DO criteria magnitudes (based on season and aquatic life use) expressed as minimums, with an allowance to drop by no more than 1 mg/L from the minimum for more than 8 hours in a 24-hour period. Additionally, Oklahoma's WQS Implementation Regulations (Chapter 46) included 305(b)/303(d) assessment procedures which provided DO magnitudes that were 1 mg/L below the minimums specified in Oklahoma's WQS, as well as an allowance for up to 10% of the samples to exceed these Chapter 46 magnitudes. In light of the Florida Impaired Waters Rule litigation, in 2010-2011 EPA Region 6 expressed concern to OWRB that Oklahoma's assessment procedures in Chapter 46 may be establishing WQS different and less stringent than established in the WQS in Chapter 45. In 2011, OWRB expediently revised Oklahoma's WQS and assessment procedures to ensure consistency between the two regulations. OWRB submitted these revisions to EPA August 1, 2011, and these revisions were approved in two separate actions³. However, in doing so, Oklahoma's DO criteria provisions in Chapter 45 became very lengthy and overly focused on assessment program implementation, thus leading to difficulty for permitting and TMDL program implementation. OWRB identified the need to clarify the existing DO provisions in Chapter 45, and Oklahoma adopted the following modifications in 2015.

This TSD is divided into three parts and appendices. Part I is the overview provided here. Part II describes the Oklahoma WQS revisions that EPA is approving and the basis for EPA's approval. Part III describes the Oklahoma WQS revisions that EPA is approving subject to the results of Endangered Species Act (ESA) consultation, and the basis for EPA's approval.

II. Revisions that EPA is Approving

EPA has concluded that approval of the new or revised WQS in Part II of this TSD either will have no effect on federally-listed endangered or threatened species or the designated critical habitat of such species, or are otherwise not subject to ESA consultation.

A. Non-Substantive Revisions

EPA determined that several revisions to Oklahoma's WQS at OAC 785:45-5-12(f)(1)(D), OAC 785:45-5-12(f)(1)(C), and Appendix G (described in more detail in the subsections that follow) are non-substantive in nature and thus do not substantively modify Oklahoma's WQS. EPA considers such non-substantive changes to existing WQS to constitute new or revised WQS that EPA has the authority and duty to approve or disapprove under CWA §303(c)(3). While such revisions do not substantively change the meaning or intent of the existing WQS, EPA believes

³ U.S. EPA – Region 6 *Technical Support Document EPA Review of 2011 Revisions to Oklahoma Water Quality Standards*, December 16, 2011; and U.S. EPA – Region 6 *Technical Support Document EPA Review of 2011 Revisions to Oklahoma Water Quality Standards: OAC 785:45-5-12(f)(D), (D)(v), and (D)(vii)*, October 3, 2012.

that it is reasonable to treat such non-substantive changes in this manner to ensure public transparency on what provisions are effective for purposes of the CWA. EPA's action on non-substantive changes to previously approved WQS do not constitute an action on the underlying previously approved WQS. Any challenge to EPA's prior approval of the underlying WQS would be subject to any applicable statute of limitations and prior judicial decisions. EPA approves the non-substantive revisions to Oklahoma's WQS adopted on February 17, 2015, identified in the subsections below, pursuant to §303(c) of the CWA. Please be advised that EPA is not approving the Oklahoma WQS for those waters or portions of waters located in Indian Country, as defined in 18 U.S.C. § 1151.

a. Removing the use support assessment language for dissolved oxygen (OAC 785:45-5-12(f)(1)(D))

OAC 785:45-5 Part 3 pertains to beneficial uses and criteria to protect these uses. The use support assessment language for DO found at OAC 785:45-5-12(f)(1)(D) is duplicated at OAC 785:46-15-5(b). Chapter 46 contains Oklahoma's implementation rules, with OAC 785:46-15-5(b) containing provisions that are used to determine whether the beneficial use of Fish and Wildlife Propagation for a waterbody is reported. These provisions are for the purposes of listing, assessment, and reporting under sections 303(d) and 305(b) of the CWA. In 2010, EPA submitted comments and planned to disapprove Oklahoma's 2010 303(d) list due to issues with the assessment for beneficial use support with respect to DO. At that time, OWRB decided the most efficient way to address these issues was to adopt the use support assessment language found in OAC 785:46-15-5(b) into Chapter 45 at OAC 785:45-5-12(f)(1)(D). This approach has led to assessment language being inadvertently adopted into Oklahoma's WQS at Chapter 45, which has created confusion relating to the implementation of Oklahoma's WQS in the state's permitting and TMDL programs. To address this, OWRB has removed the assessment related provisions at OAC 785:45-5-12(f)(1)(D) (*see Appendix A*).

When Oklahoma removed the DO use support assessment language at OAC 785:45-5-12(f)(1)(D) in 2015, it retained the DO criteria provisions from OAC 785:45-5-12(f)(1)(D)(i) and OAC 785:45-5-12(f)(1)(D)(vii) by creating two new provisions at OAC 785:45-5-12(f)(1)(C). These new provisions at OAC 785:45-5-12(f)(1)(C) will be addressed later in this TSD. Given the use support assessment language for DO from OAC 785:45-5-12(f)(1)(D) resides in OAC 785:46-15-5(b), EPA has determined this revision is non-substantive in nature.

Based on the information presented above, EPA approves the removal of the use support assessment language at OAC 785:45-5-12(f)(1)(D) pursuant to §303(c) of the CWA.

b. Modifying OAC 785:45-5-12(f)(1)(C) to reflect the removal of the use support assessment language for dissolved oxygen

OAC 785:45-5-12(f)(1)(C) stated that: "Except for naturally occurring conditions and as modified in (D) of this paragraph, the DO criteria are as set forth in Table 1 of Appendix G of this Chapter." OWRB revised this provision to state: "Except for naturally occurring conditions, the DO criteria are as set forth in Table 1 of Appendix G of this Chapter." The purpose of this revision is to reflect the removal of several provisions at OAC 785:45-5-12(f)(1)(D), as

discussed in the above subsection. Because EPA is approving the removal of the use support assessment language for DO at OAC 785:45-5-12(f)(1)(D), EPA has determined this revision to OAC 785:45-5-12(f)(1)(C) is non-substantive in nature.

Based on the information presented above, EPA approves modifying OAC 785:45-5-12(f)(1)(C) to reflect the removal of the reference to the use support assessment language at OAC 785:45-5-12(f)(1)(D), pursuant to §303(c) of the CWA.

c. Retaining the dissolved oxygen criteria provisions from OAC 785:45-5-12(f)(1)(D) that pertain to acute dissolved oxygen events (OAC 785:45-5-12(f)(1)(C))

OAC 785:45-5-12(f)(1)(D)(i) and OAC 785:45-5-12(f)(1)(D)(vii) contain provisions that prohibit the hypolimnion from exhibiting anoxic conditions (defined as <2mg/L), and prohibit acute (<2mg/L) DO occurrences in streams. OAC 785:45-5-12(f)(1)(D)(i) and OAC 785:45-5-12(f)(1)(D)(vii) were approved by EPA December 16, 2011, and October 3, 2012, respectively (*see Appendices B and C*).

In 2015, OWRB relocated these provisions from OAC 785:45-5-12(f)(1)(D)(i) and OAC 785:45-5-12(f)(1)(D)(vii), and modified them to include the magnitude, frequency, and duration components of the other DO criteria found in Chapter 45. These provisions are now found at OAC 785:45-5-12(f)(1)(C)(i) and OAC 785:45-5-12(f)(1)(C)(ii) (*see Appendix A*). The revisions to the language from OAC 785:45-5-12(f)(1)(D)(vii) related to applying the hypoxic criteria to the entire year instead of only during periods of stratification is considered a substantive change, and will be discussed under Part III of this TSD. The components that are considered non-substantive changes include provisions that prohibit more than two acute (<2 mg/L) DO occurrences per year in streams (OAC 785 :45-5-12(f)(1)(C)(i)), and a provisions that prohibit the hypolimnion of lakes from exhibiting hypoxic conditions (defined as <2 mg/L DO) (OAC 785:45-5-12(f)(1)(C)(ii)). Because EPA previously approved these provisions in 2011 and 2012, EPA has determined these revisions to OAC 785:45-5-12(f)(1)(C) are non-substantive in nature.

Based on the information presented above, EPA approves modifying OAC 785:45-5-12(f)(1)(C) to retain the DO criteria provisions from OAC 785:45-5-12(f)(1)(D), pursuant to §303(c) of the CWA.

d. Dissolved Oxygen Criteria to Protect Fish and Wildlife Propagation (Appendix G, Table 1, Footnote 4)

Appendix G of Oklahoma's WQS is titled "Numerical Criteria to Protect Beneficial Uses" and contains three tables that prescribe numerical limits for certain criteria which are necessary to protect beneficial uses. Table 1 contains numerical limits to protect the beneficial use and subcategories of Fish and Wildlife Propagation (FWP) for the single parameter of DO as set forth in OAC 785:45-5-12(f)(1). The latter limits vary depending upon several factors including the pertinent subcategory of fishery class, the time of year, and the seasonal temperature.

OAC 785:45-5-12(f)(1)(D)(vi) describes the procedure to be used for determining whether the warm water aquatic community (WWAC) use in a lake is supported with respect to Oklahoma's DO criteria for purposes of assessment, listing and reporting under CWA § 303(d) and 305(b). The WWAC designation is a subcategory of the Fish FWP beneficial use classification and is defined at OAC 785:45-1-2 as that use "where the water quality and habitat are adequate to support intolerant climax fish communities and includes an environment suitable for the full range of warm water benthos." Oklahoma's WQS at OAC 785:45-5-3(b)(1)(A) designate all lakes in Oklahoma as WWAC.

Prior to 2011, Table 1 of Appendix G of Oklahoma's WQS did not specify a frequency associated with Oklahoma's DO criteria magnitudes for the WWAC use during the Early Life Stages (ELS) season and Other Life Stages (OLS) summer season, which was inconsistent with the DO criteria assessment language found in Chapter 46. In 2011 EPA approved a provision at OAC 785:45-5-12(f)(1)(D)(vi) that included a 10% frequency in the non-support threshold associated with the WWAC use during the ELS season and OLS summer season (*see Appendix B*).

In 2015, Oklahoma removed the use support assessment provisions at OAC 785:45-5-12(f)(1)(D), but retained OAC 785:45-5-12(f)(1)(D)(vi) at Appendix G, Table 1, as Footnote 4. This provision retains the 10% exceedance rate to the criteria magnitude, but applies it across all life stages and seasons; and therefore, continues to protect beneficial uses (*see Appendix A*). For this reason, EPA has determined this modification to Appendix G, Table 1 to include Footnote 4 is non-substantive in nature.

Based on the information presented above, EPA approves modifying Appendix G, Table 1 to include Footnote 4, pursuant to §303(c) of the CWA.

III. Revisions that EPA is Approving, Subject to ESA Consultation

EPA is approving the new or revised WQS in Part III of this TSD subject to the outcome of consultation with the U.S. Fish and Wildlife Service under §7(a)(2) of the ESA.

A. Substantive Changes

Under CWA § 303(c) EPA is to review and to approve or disapprove state-adopted WQS. This review involves a determination of whether the state has adopted criteria that protect the designated water uses (see 40 CFR § 131.5 (a)(2)). Further, 40 CFR § 131.11(a)(1) requires states to adopt those water quality criteria that protect the designated use and provides that such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. In establishing criteria, 40 CFR § 131.11(b) provides that states should establish numerical values based on 304(a) Guidance, 304(a) Guidance modified to reflect site-specific conditions, or other scientifically defensible methods. EPA approves the substantive revisions to Oklahoma's WQS adopted on February 17, 2015, identified in the subsections below, pursuant to §303(c) of the CWA and 40 CFR § 131. Please be advised that EPA is not approving the Oklahoma WQS for those waters or portions of waters located in

Indian Country, as defined in 18 U.S.C. § 1151.

a. Clarifying the dissolved oxygen criteria provisions that pertain to acute dissolved oxygen events (OAC 785:45-5-12(f)(1)(C)(ii))

As stated in the previous section of this TSD, OWRB modified OAC 785:45-5-12(f)(1)(C) to include two provisions that were originally under OAC 785:45-5-12(f)(1)(D). These two provisions, OAC 785:45-5-12(f)(1)(D)(i) and OAC 785:45-5-12(f)(1)(D)(vii), are related to the DO criteria provisions that apply to acute DO events. These provisions were revised and relocated to OAC 785:45-5-12(f)(1)(C)(i) and (ii), respectively. When the language from OAC 785:45-5-12(f)(1)(D)(vii) was relocated to OAC 785:45-5-12(f)(1)(C)(ii), it was modified to apply the volumetric hypoxic criteria (2 mg/L) to the entire year instead of only during periods of stratification.

The previous provision at OAC 785:45-5-12(f)(1)(D)(vii) describes additional DO criteria applicable to the entire water column when thermal stratification is present. OAC 785:45-5-12(f)(1)(D)(vii) required at least 50% of a lake's volume to have DO concentrations of at least 2.0 mg/L. If volumetric data is not available for a lake, then 70% of the water column is used as a surrogate for 50% volume. This provision was approved by EPA October 3, 2012 (*see Appendix C*).

The new provision, as stated in OAC 785:45-5-12(f)(1)(C)(ii), will apply the volumetric hypoxic criteria to the entire year instead of only during periods of stratification (*see Appendix A*). In EPA's 2012 approval, it was determined the 50% volume threshold for subsurface DO <2 mg/L was protective of the WWAC. The most critical season for DO in lakes is typically in the warm summer months, particularly when there is strong stratification. In EPA's 2012 approval of OAC 785:45-5-12(f)(1)(D)(vii), the subsurface provisions were considered to be protective of the most extreme critical time period. These stratification events typically happen during the late summer months and can cause a reduction in available habitat for the aquatic communities. Previously, the subsurface provisions apply only when there is stratification. So, conversely, when there is no stratification, then the surface criteria have been interpreted to apply throughout the entire water column. Application of the volumetric hypoxia provision to the entire year would continue to remain protective due to the decreased likelihood of a strong stratification event occurring during the cooler seasons. Using the term "stratification" as the determining factor for when different DO criteria provisions apply has caused some issues when modeled data has been used for TMDL development. By applying subsurface criteria provisions throughout the year, Oklahoma can eliminate these TMDL implementation issues.

In the Spring of 2012, EPA enlisted contractor assistance to provide a technical review of OAC 785:45-5-12(f)(1)(D)(v) and (D)(vii). The results of this technical review are described in a white paper titled *An Analysis of Oklahoma's 2011 Stratified Lake Dissolved Oxygen Provisions* (*see Appendix D*). The analyses and conclusions described in the white paper support the conclusion that Oklahoma's stratified lake DO criteria provisions at OAC 785:45-5-12(f)(1)(D)(v) and (D)(vii) are scientifically defensible and protective of the WWAC designated use applicable to Oklahoma's lakes, thus satisfying the requirements at 40 CFR § 131.11(a)(1) and (b). Furthermore, the white paper explained that setting the requirement for at least 50% of a lake's

volume to have DO concentrations of at least 2.0 mg/L serves as an effective way to limit the hypolimnion volume to no more than 50% of the total lake volume. This, as demonstrated in the white paper using Oklahoma lake-specific DO data, is important for ensuring that any significant and rapid turnover event in a lake (though a rare event) will not result in acutely toxic conditions. Finally, based upon data that was available for Oklahoma lakes at the time of the technical review of the 2011 provisions, the white paper verified that the 70% water column threshold identified in OAC 785:45-5-12(f)(1)(D)(vii) was an appropriate surrogate for 50% volume.

Based on the information above, EPA approves Oklahoma's modified DO criteria provision found at OAC 785:45-5-12(f)(1)(C)(ii) pursuant to CWA 303(c) and 40 CFR § 131, subject to the results of the ESA consultation.

**b. Dissolved Oxygen Criteria to Protect Fish and Wildlife Propagation
(Appendix G, Table 1, Footnote 5)**

Appendix G of Oklahoma's WQS contains three tables that prescribe numerical limits for certain criteria which are necessary to protect beneficial uses. Table 1 is a chart that states the numerical limits to protect the beneficial use and subcategories of FWP for the single parameter of DO as set forth in OAC 785:45-5-12(f)(1). The latter limits vary depending upon several factors including the pertinent subcategory of fishery class, the time of year, and the seasonal temperature.

In 2015, Oklahoma adopted a provision that clarifies the WWAC DO criteria apply to surface waters of the lake, and included it at Appendix G, Table 1, Footnote 5 (*see Appendix A*). This footnote clarifies that the WWAC DO criteria are intended to apply to the surface waters: "for lakes, the WWAC DO criteria expressed above are applicable to the surface waters." The addition of language in OAC 785:46-15-5(b)(5)(D) clarifies that "surface, when used in this Section, means surface waters or mixed surface layer, typically represented by a sample taken at least 0.5 m below the surface." OWRB's document, *Proposed Dissolved Oxygen Provisions*, October 8, 2014 (*see Appendix E*), provided a justification for applying the WWAC DO criteria in Appendix G, Table 1, to surface waters. Under most scenarios, the mixed surface layer is well represented by taking a sample just below the surface. Many protocols for DO sampling in lakes call for the sample to be taken somewhere within the first meter of depth. A common protocol in Oklahoma has been to take the sample at around 0.5 meters from the surface. Continuation of this approach should provide a representative sample in most situations. If the person making a water quality assessment determines that the surface sample does not represent the mixed layer, then another sample, or aggregation of samples, that better represents the mixed layer could be used.

Additionally, Appendix 1 of the OWRB justification document contained the DO profiles for several reservoirs in Oklahoma from OWRB's monitoring program. These DO profiles represented stratified and nonstratified lakes. The data indicates that taking the sample just below the surface is representative of the mixed layer, or epilimnion.

Based on the information OWRB provided, the new provision at Appendix G, Table 1, Footnote 5, will protect the WWAC subcategory of the FWP beneficial use consistent with 40 CFR

131.11(a)(1). EPA approves this provision pursuant to CWA 303(c) and 40 CFR § 131, subject to the results of the ESA consultation.

c. Site-Specific Criteria for Metals Which Have Been Developed for Particular Waterbodies (Appendix E)

The City of Broken Bow Public Works Authority (Broken Bow PWA) is authorized to discharge treated municipal and industrial wastewater from the city's wastewater treatment plant (OPDES Permit No. OK0021521). The city's discharge is to an unnamed tributary to Yanubbe Creek located in southeastern Oklahoma. On May 29, 2012, the Oklahoma Department of Environmental Quality (ODEQ), the National Pollutant Discharge Elimination System (NPDES) permitting authority in Oklahoma, granted a request from Broken Bow PWA to conduct a water effect ratio (WER) study for multiple metals, including copper, lead, and zinc. The City of Broken Bow hired GBMc & Associates to conduct the WER study.

On August 6, 2012, Broken Bow PWA submitted an initial work plan for the WER study to OWRB. In response to a request from OWRB, Region 6 reviewed and provided comments to OWRB on the initial work plan on September 26, 2012. A revised work plan was shared with OWRB and Region 6 on December 17, 2012.

The work plan described the site water to be used for WER testing as 100% effluent (no dilution), and stated that copper WER testing would follow USEPA's 2001 *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*. WER testing for zinc would follow USEPA's 1994 *Interim Guidance on Determination and Use of Water Effect Ratios for Metals*.⁴ GBMc began WER testing in June 2013. The WER study was conducted using the aforementioned EPA guidance and methodology, in addition to OWRB's "Guidance Document for the Development of Site-Specific Water Quality Criteria for Metals" (OWRB 2003). This OWRB guidance provides procedural information for developing site-specific criteria within the State of Oklahoma. This document was used in conjunction with EPA guidance and methodology to develop an Oklahoma-defined final WER (fWER) which includes both a water effect ratio (WER) and a total to dissolved translator (f). The fWER is utilized to calculate a final criterion translator (T), which is used to develop site-specific total recoverable criterion and revise permit limits based on site-specific information while allowing for adequate protection of aquatic life in the receiving stream. Following the completion of WER toxicity tests and dissolved translator sampling, an additional toxicity test was conducted to evaluate the potential for toxicity additivity or synergism.

Ceriodaphnia dubia was chosen as the test organism for the copper WER. For the lead and zinc portion of the study, *Ceriodaphnia dubia* was chosen as the primary test organism, and *Pimephales promelas* (fathead minnow) was chosen as the secondary species. Throughout the study problems with tests for the lead portion became apparent. As is shown in the data, two tests (one *Ceriodaphnia*, one *Pimephales*) were invalid due to a failure to produce enough toxicity to yield an LC50 (concentration in water having 50% chance of causing death to aquatic life) in both the site water mix (SWM) and lab water tests. In two other tests, the WER results were acceptable. It was determined through discussion with the testing laboratory that problems were

⁴ Hereinafter this is referred to as EPA's 1994 interim WER guidance.

most likely due to the low solubility of lead. In producing serial dilutions for the test, a precipitant of lead sulfate would form due to sulfate and chloride ions present in the effluent thereby changing the chemistry of the SWM. Based upon this information and variability of the results, Broken Bow decided to abandon the lead portion of the study.

On January 16, 2014, Region 6 provided technical comments to OWRB on the initial data collected by the City of Broken Bow in support of the WERs for copper and zinc. The final report, *Water Effects Ratio and Dissolved Translator Study*, was submitted to Region 6 for review June 19, 2014. Region 6 provided comments on the final report on August 1, 2014. A response to comments and a revised report was submitted to the Region September 23, 2014. On November 17, 2014, Region 6 received the final report for review. On November 5, 2014, and January 9, 2015, the Region provided comments on the final calculations used to derive the site-specific criteria.

On February 17, 2015 OWRB adopted the following provision to Appendix E, Section I:

7. City of Broken Bow to Unnamed Tributary of Yanubbe Creek at SE 1/4 of SE 1/4 of Section 18, T 6 S, R 24 E1M, McCurtain County, Oklahoma (Latitude 34° 01' 37.165" North, Longitude 94° 43' 22.270" West)

A. Copper

A site-specific criteria modification study has been satisfactorily completed for copper for the City of Broken Bow Public Works Authority discharge to Unnamed Tributary of Yanubbe Creek. All criteria are calculated at an in-stream harness of 34.9 mg/L.

$$fWER_t = 0.0995$$

$$fWER_d = 0.1253$$

$$f = 0.6544$$

The results of the study allow any of the four following criteria to be utilized

$$C_{cst} = 5.20 \mu\text{g/L} \quad \text{Statewide criterion}$$

$$S_{cst} = 52.28 \mu\text{g/L} \quad \text{Option 1}$$

$$S_{cst} = 7.628 \mu\text{g/L} \quad \text{Option 2}$$

$$S_{cst} = 60.87 \mu\text{g/L} \quad \text{Option 3}$$

$$C_{ast} = 7.12 \mu\text{g/L} \quad \text{Statewide criterion}$$

$$S_{ast} = 71.58 \mu\text{g/L} \quad \text{Option 1}$$

$$S_{ast} = 10.45 \mu\text{g/L} \quad \text{Option 2}$$

$$S_{ast} = 83.34 \mu\text{g/L} \quad \text{Option 3}$$

B. Zinc

A site-specific criteria modification study has been satisfactorily completed for zinc for the City of Broken Bow Public Works Authority discharge to Unnamed Tributary of Yanubbe Creek. All criteria are calculated at an in-stream harness of 34.9 mg/L.

$fWER_t = 0.6312$
 $fWER_d = 0.7502$
 $f = 0.7343$

$C_{cst} = 43.44 \mu\text{g/L}$	Statewide criterion
$S_{cst} = 68.82 \mu\text{g/L}$	Option 1
$S_{cst} = 58.33 \mu\text{g/L}$	Option 2
$S_{cst} = 77.75 \mu\text{g/L}$	Option 3

$C_{ast} = 47.96 \mu\text{g/L}$	Statewide criterion
$S_{ast} = 75.99 \mu\text{g/L}$	Option 1
$S_{ast} = 63.88 \mu\text{g/L}$	Option 2
$S_{ast} = 85.15 \mu\text{g/L}$	Option 3

Based on a review of the study, these site-specific criteria have been demonstrated to be protective of aquatic life and are approved for Clean Water Act purposes. EPA approves the new provisions at Appendix E, Section I, which includes the copper and zinc site-specific criteria for the City of Broken Bow Public Works Authority, pursuant to CWA 303(c) and 40 CFR § 131, subject to the results of the ESA consultation.

Appendices